

CLAIMS

1. A method of detecting and quantifying trace levels of molecules containing one or more of a range of reactive species, in gases or gas mixtures consisting of alkanes, ethene, or ethyne, said method including using an alkoxyalkyl cation as the chemical ionisation precursor in a selected ion flow tube mass spectrometer.
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2. The method as claimed in claim 1, further including reacting the sample gas to be analysed with the alkoxyalkyl cation in a stream of helium in the flow tube.
- 10 3. The method as claimed in claim 1, wherein the alkoxyalkyl cation is a methoxymethyl cation.
4. A method of detecting and quantifying a gas sample containing trace levels of molecules containing one or more of a range of reactive species, in gases or gas mixtures
15 consisting of alkanes, ethene, or ethyne in a selected ion flow tube mass spectrometer comprising the steps of:
 producing a supply of alkyoxymethyl cations,
 mass electing the alkyoxymethyl cations,
 inducing a flow of the alkyoxymethyl cations into the inlet of a flow tube of the
20 spectrometer in a carrier flow of helium
 reacting the gas sample with the alkyoxymethyl cations,
 analysing the reacted gas sample in the mass spectrometer, and
 calculating the concentration of the trace levels of molecules containing heteroatoms present in the reacted gas sample.
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5. The method as claimed in claim 4, wherein the alkyoxymethyl cation is a methoxymethyl cation.
6. The method as claimed in claim 5, wherein the range of reactive species includes
30 molecules that contain sulphur, nitrogen, oxygen, phosphorus or silicon heteroatoms,